

Plug-in modules for
total pressure gauges and controllers
TPG 300 and IMG 300

Installation
Operation
Maintenance
Technical data

CE

Table of contents

1 Safety	4	5 Technical data	18
1.1 Safety information	4	5.1 Pirani measurement boards	18
1.2 Explanation of symbols	4	5.2 Cold cathode measurement boards	19
1.3 General stipulations	4	5.3 Pirani / cold cathode measurement boards	20
2 Description	5	5.4 Interface boards	22
2.1 Pirani measurement boards	5	6 Troubleshooting	24
2.2 Cold cathode measurement boards	5	6.1 Installation problems	24
2.3 Pirani- / cold cathode measurement boards	5	6.2 Operating and adjustment problems	24
2.4 Interface boards	5	6.3 Defects	25
2.5 Pirani measurement	5	6.4 Problems with the RS-232-C interface	25
2.6 Cold cathode measurement	5	6.5 Problems with the RS-422 interface	26
3 Installation	6	7 Accessories	27
3.1 Installing / removing plug-in modules	7	7.1 Gauges	27
3.2 Connecting the Pirani gauge	7	7.2 Measurement cable	28
3.3 Connecting the cold cathode gauge	8	7.3 Accessories for interface boards	32
3.4 Connecting the <OUTPUT> analog signal	9	8 Spare parts	33
3.5 Connecting the <CONTROL> analog signals	10	8.1 Measurement boards	33
3.6 Connecting the relays of the IF 300A	11	8.2 Interface boards	34
3.7 Connecting the relays of the IF 300B	11		
3.8 Connecting the relays of the IF 300C	12		
3.9 Connecting the RS-232-C interface to the IF 300A	13	Appendix	35
3.10 Connecting the RS-232-C interface to the IF 300B	14	A: Output signals of the measurement boards	35
3.11 Connecting the RS-422 interface to the IF 300C	16	B: Gas type dependence	37
4 Adjustment	17		
4.1 Adjusting the Pirani measurement circuit	17		

The present documentation describes the plug-in modules for the total pressure gauges and controllers TPG 300 and IMG 300 and supplements the manual of the correspondingly configured pressure gauge.

Validity

This manual applies to plug-in modules with part number

BG 546 920 -T	(PI 300D)
BG 549 212 -T	(PI 300DL)
BG 549 214 -T	(PI 300DN)
BG 549 216 -T	(PI 300DLN)
BG 441 170 -T	(PE 300C9)
BG 441 261 -T	(PE 300C10)
BG 441 262 -T	(PE 300T10)
BG 441 263 -T	(PE 300T11)
BG 441 375 -T	(PE 300DC9)
BG 441 350 -T	(PE 300DT9)

BG 441 000 -T	(CP 300C9)
BG 441 111 -T	(CP 300T9L)
BG 441 114 -T	(CP 300C10)
BG 441 116 -T	(CP 300T10)
BG 441 143 -T	(CP 300T10L)
BG 441 080 -T	(CP 300T11)
BG 441 120 -T	(CP 300T11L)
BG 441 110 -T	(CP 300C9N)
BG 441 112 -T	(CP 300T9LN)
BG 441 115 -T	(CP 300C10N)
BG 441 130 -T	(IF 300A)
BG 441 250 -T	(IF 300B)
BG 441 390 -T	(IF 300C)

The part number can be taken from the nameplate.

The functions described as well as the illustrations and data contained in this manual are subject to change without notice.

1 Safety

1.1 Safety information

- a) Take the necessary precautions when doing installation work.
It may be necessary implement additional protective measures in the system.
- b) Before connecting any external elements, check that they are compatible with the technical data in this document.
- c) Take the necessary precautions when doing maintenance or repair work.



Specialists:

This work may only be carried out by persons with suitable technical training and the necessary experience.



Waiting, reaction time, duration of test

<....> Marking

→ See page ...

1.2 Explanation of symbols



DANGER:

Information on preventing any kind of personal injury or extensive equipment damage.



CAUTION:

Special information on damage prevention.



NOTE:

Special information on cost-effective use.

1.3 General stipulations

Since the individual components are delicate, appropriate measures must be taken to protect them from static electricity. Store modules in antistatic bags or containers.

Damage resulting from incorrect handling may lead to a revocation of the guarantee.

Balzers accepts no responsibility nor warranty if the user or third parties

- utilize the product not according to the defined use
- make any kind of changes (modifications, alterations, etc.) to the product.

2 Description

2.1 Pirani measurement boards

Pirani boards have two independent medium vacuum measurement circuits, each with one gauge cable connector, two trimmer potentiometers and one analog signal output. When the control unit is on, the Pirani measurement circuits are in continuous operation. The analog signals are constantly available, independent of what is shown on the pressure display.

2.2 Cold cathode measurement boards

Cold cathode measurement boards for the measurement of high and ultra high vacuum contain one or two measurement circuits, each with one gauge cable connector and one analog signal output. When the gauge is turned on, the analog signals are constantly available, independent of what is shown on the pressure display.

Measurement boards for the range of 10^{-10} and 10^{-11} mbar and those with two measurement circuits contain special electronics to limit the measurement current to 100 μA , a feature that considerably extends the lifetime of the gauge.

2.3 Pirani- / cold cathode measurement boards

As the name indicates, these are combined boards containing one Pirani and one cold cathode measurement circuit each. They have the same characteristics as the boards described above.

2.4 Interface boards

Three types of interface boards are available: Two contain an RS-232-C interface, one an RS-422 interface. All three types have five relays with one floating changeover contact each. The main difference between these three boards is the switching voltage required for the relays and the type of interface port.

2.5 Pirani measurement

Within certain limits the thermal conductivity of gases is a function of the pressure. Pirani thermal conductivity vacuum gauges exploit this phenomenon for pressure measurements.

The measurement element consists of a thin filament with a high temperature coefficient. The resistance of the wire and consequently its temperature are maintained at a constant value by means of a suitable control circuit. The electrical power supplied to the filament is, therefore, a measure of the thermal conductivity and consequently the gas pressure.

2.6 Cold cathode measurement

The current flowing in a self-sustained gas discharge with a cold cathode (similar to Penning) depends on the applied voltage, the gas composition, and the pressure. A magnetic field that penetrates the measurement chamber has the effect that the electrons move along a spiral trajectory from the cathode to the anode and thereby cause even at low gas densities a sufficient number of ionizing impacts for maintaining the discharge. If (with a known gas type) the anode voltage and magnetic field are kept constant, the discharge current is a measure of the pressure.

3 Installation

General



Use screened cables only (connect screen to barrel of connector). If both ends of the screen are connected to ground, compensating currents must be prevented (e.g. by connecting all involved units to a common power distributor).

- Installing / removing plug-in modules
- Connecting the relays
- Connecting the RS-232-C interface
- Connecting the RS-422 interface

Interface board	→			
IF 300A	7	11	13	—
IF 300B	7	11	14	—
IF 300C	7	12	—	16

Measurement board	→			
PI 300D	7	7	—	9
PI 300DL				
PI 300DN				
PI 300DLN				
PE 300C9				
PE 300C10	7	—	8	9
PE 300T10				
PE 300T11				
PE 300DC9				
PE 300DT9	7	—	8	10
CP 300C9				
CP 300C9N				
CP 300C10				
CP 300C10N				
CP 300T9L				
CP 300T9LN				
CP 300T10	7	7	8	9
CP 300T10L				
CP 300T11				
CP 300T11L				

- Installing / removing plug-in modules
- Connecting the Pirani gauge
- Connecting the cold cathode gauge
- Connecting the analog signal

3.1 Installing / removing plug-in modules



For safety reasons, vacant slots should always be covered with blank plates.

Disconnect all cables from the unit before installing / removing any plug-in modules.



Modules should only be handled on an ESD protected bench.

Procedure

- Switch off the unit and wait one minute
- Remove **all** cables (power cable last)
- Unscrew the blind plate / plug-in module
- Insert / remove plug-in module
- Screw on the plug-in module / blind plate
- Connect the cables (mains cable first)
- Switch on the unit again



To ensure correct operation, check that the screws of the plug-in modules are tightened.

3.2 Connecting the Pirani gauge



Additional protective measures must be taken if certain processes in the vacuum system (e.g. flashovers) can cause hazardous voltages on the gauge terminals.



Although the gauge cables are screened, they should not be routed in parallel to lines producing strong noise.

Connect the gauge to the <TPR> connector on the rear panel. The connectors are locked so that they cannot be separated accidentally.



If the cable length is <100 m, the module for short cables should preferably be used, otherwise the adjustment becomes more difficult. For gauge cables >100 m the version for long cables should be used.

3.3 Connecting the cold cathode gauge



Additional protective measures must be taken if certain processes in the vacuum system (e.g. flashovers) can cause hazardous voltages on the gauge terminals.



Although the gauge cables are screened, they should not be routed in parallel to lines producing strong noise.

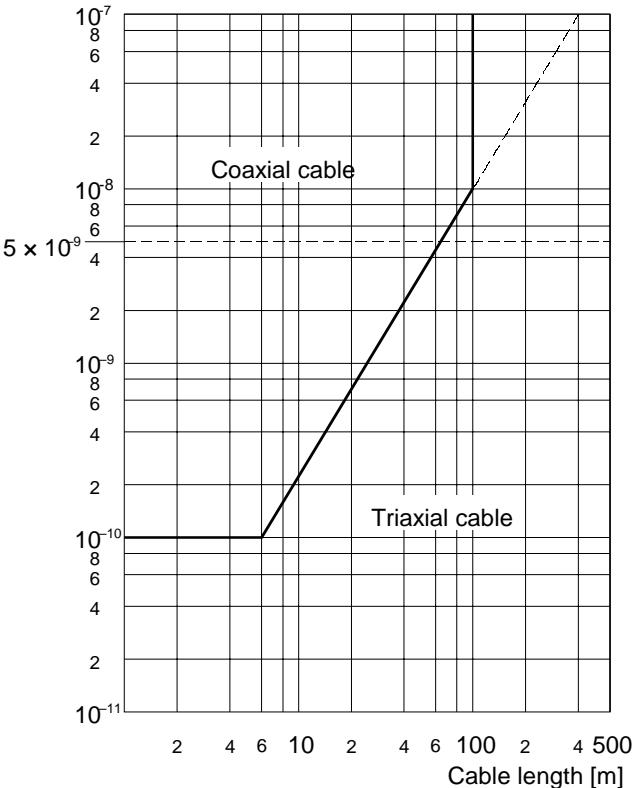
Connect the gauge to the <IKR> connector. Coaxial cables normally suffice. The following diagram indicates the conditions under which a triaxial cable is required.



The maximum length of 100 m for coaxial cables is specified by EN 61010. Greater lengths are **not** admissible **without** additional protective measures.

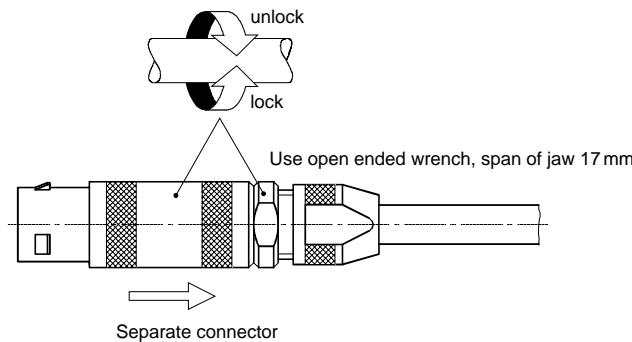
If the gauge is not grounded via the vacuum chamber, it **must be grounded** separately.

Pressure [mbar]





If the cable length is >100 m (only admissible with triaxial cable), the connectors must be protected against unintentional separation and contact of the center conductor. The cable must only be plugged in or detached while the unit is switched off.

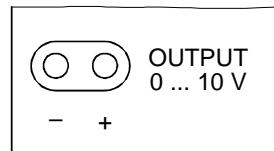


Protection against unintentional separation of the triaxial connector

3.4 Connecting the <OUTPUT> analog signal

(except for PE 300DC9 and PE 300DT9)

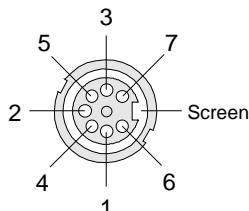
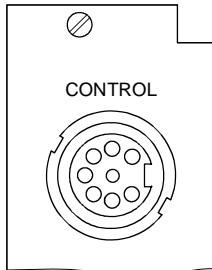
Each measurement circuit is equipped with an analog signal output. Matching connectors are included with each measurement module.



3.5 Connecting the <CONTROL> analog signals

(only for PE 300DC9 and PE 300DT9)

Each measurement circuit is equipped with a control input and an analog signal output. Matching connectors are included with each measurement module.



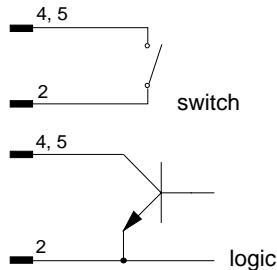
Pin assignment

Pin 1	Analog GND IKR 1
Pin 2	Digital GND
Pin 3	Analog GND
Pin 4	IKR ON 1
Pin 5	IKR ON 2
Pin 6	Analog Output
Pin 7	Analog Output
Housing	Screen

External switching on / off of the measurement circuit

There are various ways to switch a measurement circuit on / off:

- manually
- automatically
- externally
via a contact on the <control> connection

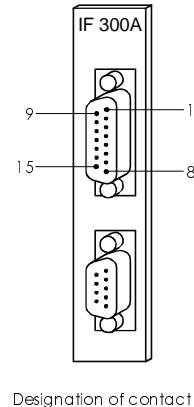
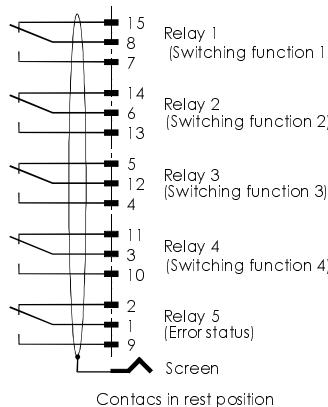


Switch on the gauge manually or automatically before initiating gauge control via an external input.

3.6 Connecting the relays of the IF 300A

Pin assignment

The relay connector on the rear of the IF 300A has the following pin assignment:



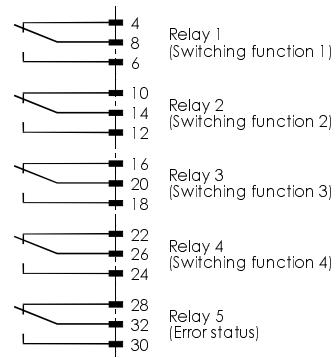
Contacts in rest position

3.7 Connecting the relays of the IF 300B

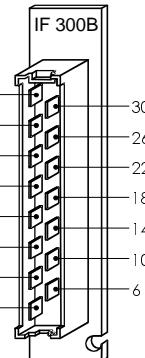
Pin assignment

The relay connector on the rear of the IF 300B has the following pin assignment:

(It is not necessary to use screened cables.)



Contacts in rest position



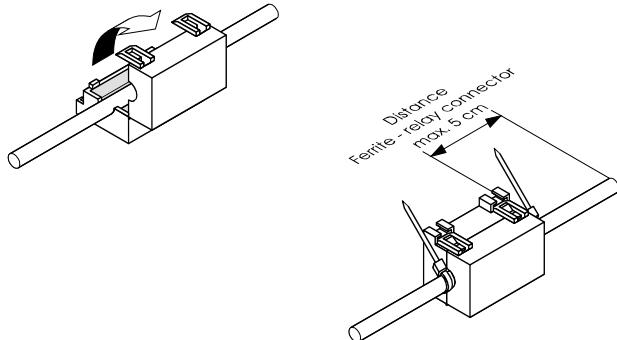
The connectors may only be wired, mounted, plugged in, and unplugged in de-energized condition.

At voltages <50 V **insulated** blade receptacles 4.8 x 0.8 mm may be used. However, also in this case we recommend the use of the relay connector because it permits fast separation of the connection as well as strain relief.

Always use the relay connector at voltages ≥ 50 V ($\rightarrow \square 32$) for safety reasons.



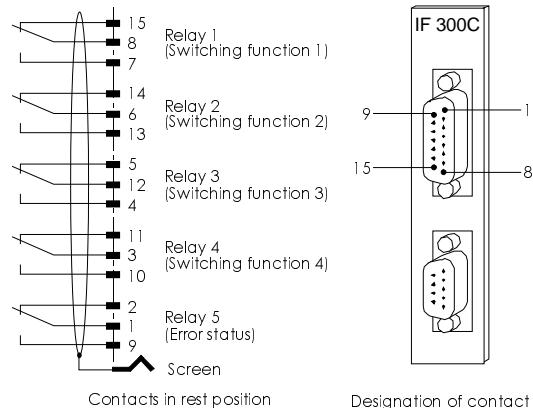
Mount the enclosed ferrite clamp in order to reduce the electromagnetic interference.



3.8 Connecting the relays of the IF 300C

Pin assignment

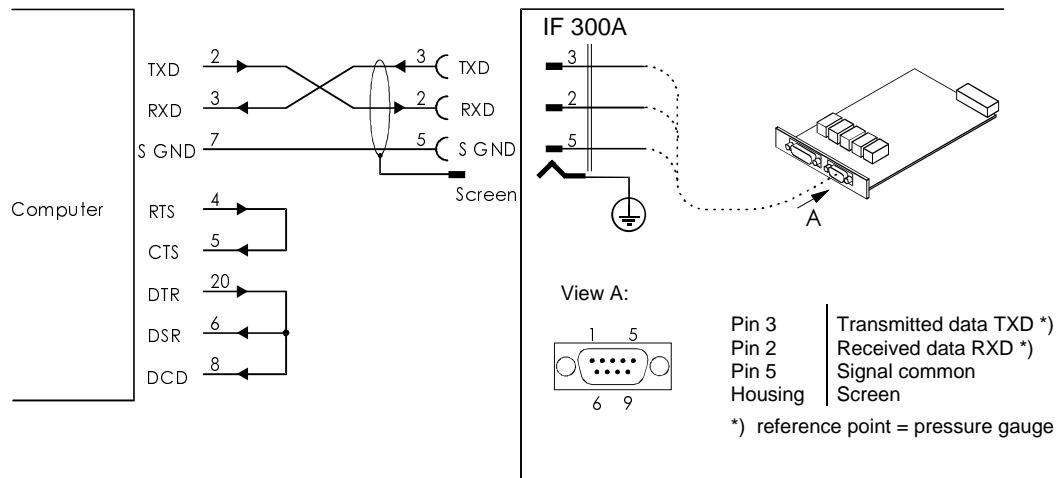
The relay connector on the rear of the IF 300C has the following pin assignment:



3.9 Connecting the RS-232-C interface to the IF 300A

Pin assignment

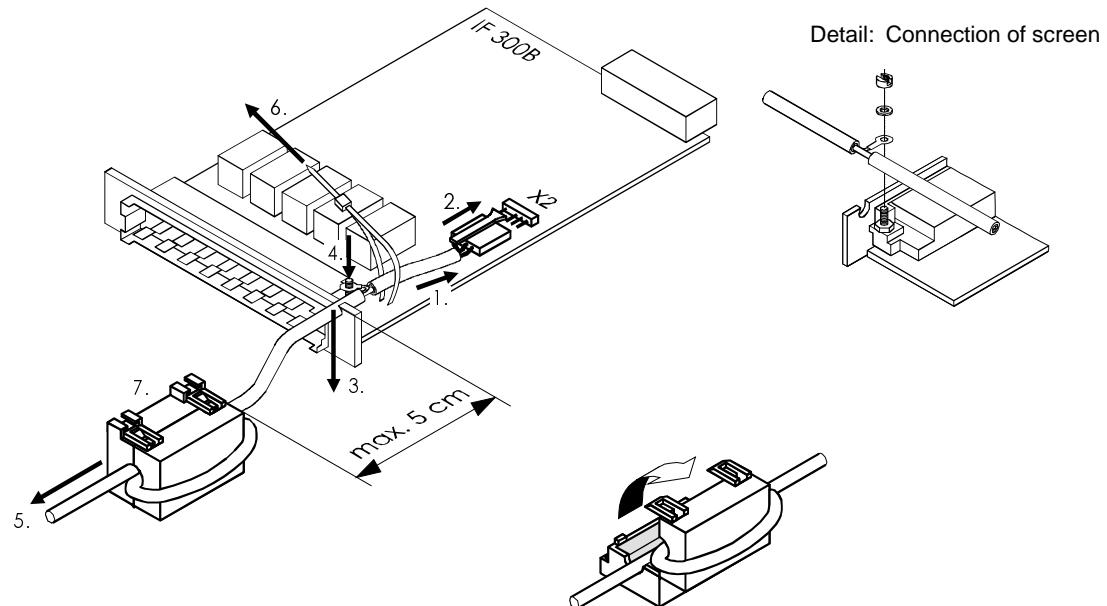
The interface connector on the rear of the IF 300A has the following pin assignment:



3.10 Connecting the RS-232-C interface to the IF 300B

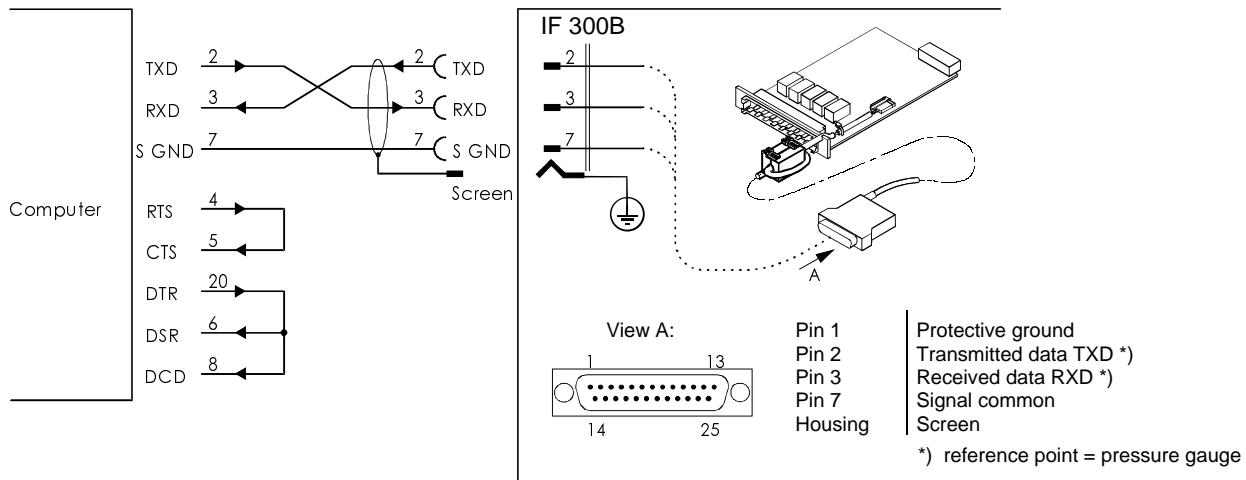
Interface cable

If you intend to use the RS-232-C interface, you must first install the interface cable in the specified sequence:



Pin assignment

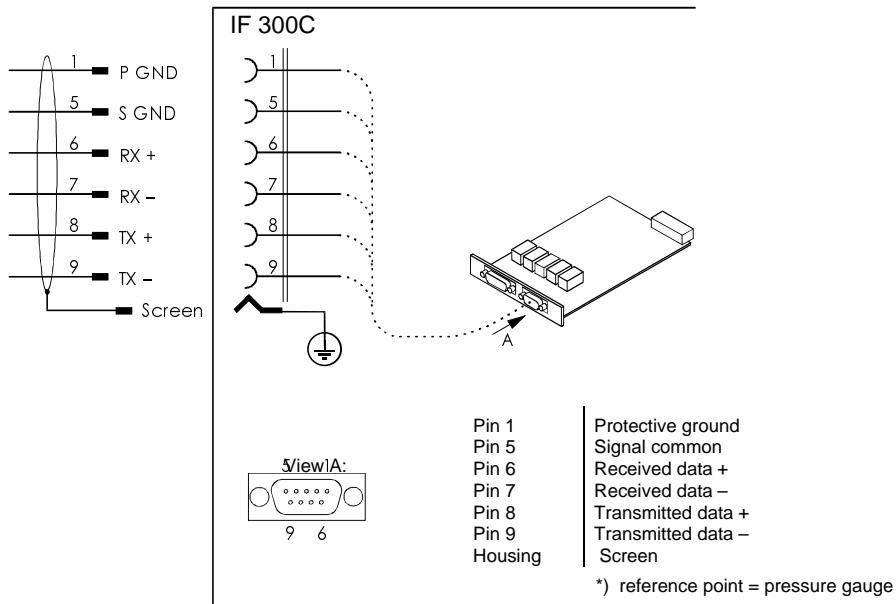
The interface connector on the rear of the IF 300B has the following pin assignment:



3.11 Connecting the RS-422 interface to the IF 300C

Pin assignment

The interface connector on the rear of the IF 300C has the following pin assignment:

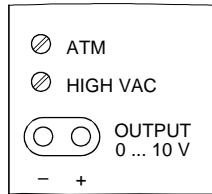


4 Adjustment

Pirani measurement circuits are factory-adjusted to the standard gauge. Due to manufacturing tolerances, contamination of the gauges, and different cable lengths, deviations are inevitable.

Cold cathode measurement circuits are factory-adjusted and require no readjustment.

4.1 Adjusting the Pirani measurement circuit



Two trimmer potentiometers are available for compensating the gauge tolerances, gauge contamination, or different cable lengths, within certain limits.



The adjustment should only be performed after the equipment has attained operating temperature (after ≈ 10 min.).

Adjustment at high vacuum

- With gauge connected, lower the vacuum chamber pressure to $<1\times10^{-4}$ mbar
- Select the measurement circuit to be adjusted (SENSOR-mode)
- With the <HIGH VAC> potentiometer adjust the display to 8.0×10^{-4} mbar
- Turn the potentiometer clockwise by 90°
- «ur 10⁻⁴» should now be displayed

Adjustment at atmospheric pressure

- Expose the gauge to atmospheric pressure (vent the vacuum chamber)
- Turn the <ATM> potentiometer to obtain a reading of 1.0×10^3 mbar
- Decrease the pressure to $<1\times10^{-4}$ mbar
- Check the high vacuum reading and readjust, if necessary

Pirani measurement circuits for cable lengths < 100 m

- PI 300D, PI 300DN
- CP 300C9, CP 300C10, CP 300T10, CP 300T11, CP 300C9N, CP 300C10N

Pirani measurement circuit for cable lengths > 100 m

- PI 300DL, PI 300DLN
- CP 300T9L, CP 300T10L, CP 300T11L, CP 300T9LN

Same procedure as described above, however starting with atmospheric pressure.

5 Technical data

5.1 Pirani measurement boards

Plug-in module	PI 300D	PI 300DL	PI 300DN	PI 300DLN
Number of measurement circuits	2	2	2	2
Measurement range ¹⁾ from 1000 mbar ... mbar	8×10^{-4}	8×10^{-4}	8×10^{-4}	8×10^{-4}
Measurement line length, max. m	100	500	100	500
Signal output				
Measured value, analog Error message (Error)	V V	0 ... +10 > 11.5	0 ... +10 > 11.5	0 ... +10 > 11.5
Current, max.	mA	2	2	2
Output resistance	Ω	400	400	400
Reaction time (10 \Rightarrow 90%) for sudden pressure change				
< 10^{-3} ... 10^3 mbar 10^3 ... < 10^3 mbar	ms ms	< 50 < 600	< 50 < 600	< 50 < 600
Connection, equipment side				
TPR gauge	socket	Amphenol C91E 6 pin	Amphenol C91E 6 pin	Amphenol C91E 6 pin
Signal output (laboratory sockets)	\emptyset mm	2	2	2
Weight	kg	0.14	0.14	0.14

1) N₂ equivalent

5.2 Cold cathode measurement boards

Plug-in module	PE 300C9	PE 300C10	PE 300T10	PE 300T11	PE 300DC9	PE 300DT9
Number of measurement circuits	1	1	1	1	2	2
Measurement range ¹⁾ from 5×10^{-3} mbar ...	mbar	5×10^{-9}	1×10^{-10}	1×10^{-10}	1×10^{-11}	1×10^{-9}
Measurement line length, max.	m	60 ²⁾ ... 100	60 ²⁾ ... 100	500	500	500
Power supply of gauge						
Operating voltage	kV	3.3	3.3	3.3	3.3	3.3
Measurement current, max.	μA	600	100	100	100	100
Signal output						
Measured value, analog	V	0 ... +10	0 ... +10	0 ... +10	0 ... +10	0 ... +10
Error message (Error)	V	> 11.5	> 11.5	> 11.5	> 11.5	> 11.5
Current, max.	mA	2	2	2	2	2
Output resistance	Ω	400	400	400	400	400
Reaction time (10 \Rightarrow 90%) for sudden pressure change						
< 10^{-9} ... 10^3 mbar	ms	< 10	< 50	< 50	< 50	< 20
Connection, equipment side						
IKR gauge	socket	SHV coaxial	SHV coaxial	triaxial	SHV coaxial	triaxial
Signal output	socket	\varnothing 2 mm	\varnothing 2 mm	\varnothing 2 mm	Amphenol C91E 7 pin	Amphenol C91E 7 pin
Weight	kg	0.17	0.2	0.24	0.24	0.3

1) N₂ equivalent

2) when using the lower measurement range limit (\rightarrow 8)

5.3 Pirani / cold cathode measurement boards

Plug-in module	CP 300C9 CP 300C9N	CP 300T9L CP 300T9LN	CP 300C10 CP 300C10N	CP 300T10	CP 300T10L	CP 300T11	CP 300T11L
Number of measurement circuits	1 each	1 each	1 each	1 each	1 each	1 each	1 each
Measurement range ¹⁾							
Pirani, 1000 mbar ... mbar	8×10^{-4}	8×10^{-4}	8×10^{-4}	8×10^{-4}	8×10^{-4}	8×10^{-4}	8×10^{-4}
Cold cathode, 5×10^{-3} mbar ... mbar	5×10^{-9}	5×10^{-9}	1×10^{-10}	1×10^{-10}	1×10^{-10}	1×10^{-11}	1×10^{-11}
Measurement line length							
Pirani, max. m	100	500	100	100	500	100	500
Cold cathode, max. m	$60^2)$... 100	500	$60^2)$... 100	500	500	500	500
Power supply of IKR gauge							
Operating voltage kV	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Measurement current, max. μA	600	600	100	100	100	100	100
Signal output							
Measurement value, analog V	0 ... +10	0 ... +10	0 ... +10	0 ... +10	0 ... +10	0 ... +10	0 ... +10
Error message (Error) V	> 11.5	> 11.5	> 11.5	> 11.5	> 11.5	> 11.5	> 11.5
Current, max. mA	2	2	2	2	2	2	2
Output resistance Ω	400	400	400	400	400	400	400
Reaction time (10 \Rightarrow 90%) for sudden pressure change							
Pirani							
< 10^{-3} ... 10^3 mbar	ms	< 50	< 50	< 50	< 50	< 50	< 50
10^3 ... < 10^3 mbar	ms	< 600	< 600	< 600	< 600	< 600	< 600
Cold cathode							
10^{-9} ... 10^3 mbar	ms	< 10	< 10	< 50	< 50	< 50	< 50

Plug-in module		CP 300C9 CP 300C9N	CP 300T9L CP 300T9LN	CP 300C10 CP 300C10N	CP 300T10	CP 300T10L	CP 300T11	CP 300T11L
Connection, equipment side								
TPR gauge	socket	Amphenol C91E 6 pin	Amphenol C91E 6 pin	Amphenol C91E 6 pin	Amphenol C91E 6 pin	Amphenol C91E 6 pin	Amphenol C91E 6 pin	Amphenol C91E 6 pin
IKR gauge	socket	SHV coaxial	SHV coaxial	triaxial	triaxial	triaxial	triaxial	triaxial
Signal output (laboratory sockets)	Ø mm	2	2	2	2	2	2	2
Weight	kg	0.21	0.23	0.23	0.25	0.25	0.25	0.25

1) N₂ equivalent

2) When using the lower measuring range limit (→ 8)

5.4 Interface boards

Plug-in module	IF 300A	IF 300B	IF 300C
Relay			
Number	5	5	5
Contact type	1 changeover contact each floating max. 50 V~ relative to other contacts and ground	1 changeover contact each floating max. 250 V~ relative to other contacts and ground	1 changeover contact each floating max. 50 V~ relative to other contacts and ground
Characteristic data AC			
Switching voltage, max.	50 V~	250 V~	50 V~
Switching current, max.	1.5 A	4 A	1.5 A
Switching power, max.	75 VA	1000 VA	75 VA
Characteristic data DC			
Switching current, max.	Switching voltages >50 V= are inadmissible for safety reasons 0.6 A at 50 V= 0.8 A at 40 V= 1.5 A at 30 V=	0.25 A at 200 V= 0.3 A at 140 V= 0.4 A at 100 V= 0.5 A at 60 V= 0.6 A at 50 V= 0.8 A at 40 V= 4.0 A at 30 V=	Switching voltages >50 V= are inadmissible for safety reasons 0.6 A at 50 V= 0.8 A at 40 V= 1.5 A at 30 V=
Switching power, max.		120 W	

Plug-in module	IF 300A	IF 300B	IF 300C
Connection, equipment side			
Type	D-Sub connector, 15 pin, male	GdsA-H, DIN 41 612, 15 pin, male  Connectors may only be joined or separated when not energized.	D-Sub connector, 15 pin, male
Volume resistance with socket	125 mΩ	70 mΩ	125 mΩ
Interface			
Type	RS-232-C, asynchronous	RS-232-C, asynchronous	RS-422, asynchronous
Baud rates	300, 1200, 2400, 4800, 9600	300, 1200, 2400, 4800, 9600	300, 1200, 2400, 4800, 9600
Data format	ASCII 1 start bit, 8 data bits, 1 stop bit, no parity bit	ASCII 1 start bit, 8 data bits, 1 stop bit, no parity bit	ASCII 1 start bit, 8 data bits, 1 stop bit, no parity bit
Connection, equipment side	D-Sub connector, 9 pin, male	0.4 m cable with D-Sub connector, 25 pin, male	D-Sub connector, 9 pin, female
Cable length, max.	30 m	30 m	1200 m
Weight	0.14 kg	0.15 kg	0.14 kg



Before connecting any external elements, check that they conform to the above technical data.

6 Troubleshooting

6.1 Installation problems

Symptom	Possible cause	Remedy
Gauge cable cannot be connected to IKR gauge	Old IKR gauge with MHV connector	Use the right cable (→ 30 f.)
		Change the connector (→ gauge)
Gauge cable cannot be connected to the measurement board	Gauge cable with old connector	Use the right cable (→ 30 ff.)
		Remove and replace connector (→ 30 ff.)

6.2 Operating and adjustment problems

Symptom	Possible cause	Remedy
Pirani reading too high	Pirani gauge contaminated	Adjust Pirani measurement circuit (→ 17)
		Clean gauge (→ gauge)
		Replace gauge
Cold cathode reading too high	Connector insulation contaminated or moist	Clean insulation or replace connector
	Air humidity (⇒ leakage current)	Keep the air humidity low
		Keep the equipment in constant operation
Cold cathode reading too low	Cold cathode gauge contaminated	Clean gauge (→ gauge)
Pirani can not be adjusted	Wrong combination measurement board / gauge / cable	Select right combination according to 7
	Gauge severely contaminated	Clean or replace gauge (→ gauge)

6.3 Defects

Symptom	Possible cause	Remedy
Cold cathode continually indicates «   » (overrange), even though the pressure is within the measuring range	Short circuit in the cold cathode cable / gauge	Replace or repair the cable / gauge
	Cold cathode measurement board defective	Replace the cold cathode measurement board ($\rightarrow \text{§ } 7$)
Cold cathode indicates «   » (underrange), even though the pressure is within the measuring range	No IKR gauge connected	Connect the gauge
	Interruption in cold cathode cable	Replace or repair the cable
	Cold cathode gauge defective	Replace the gauge ($\rightarrow \text{§ } 6$ gauge)
	Cold cathode measurement board defective	Replace the cold cathode measurement board ($\rightarrow \text{§ } 7$)

6.4 Problems with the RS-232-C interface

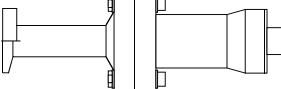
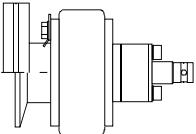
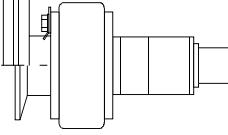
Symptom	Possible cause	Remedy
No communication	Pins 2 and 3 of the interface cable not crossed	Use the cable according to § 13 or 14
	Wrong baud rate	Match the baud rate
	Wrong data format	Adhere to the format specified for the basic unit

6.5 Problems with the RS-422 interface

Symptom	Possible cause	Remedy
No communication	Wrong baud rate	Match the baud rate
	Wrong data format	Adhere to the format specified for the basic unit

7 Accessories

7.1 Gauges

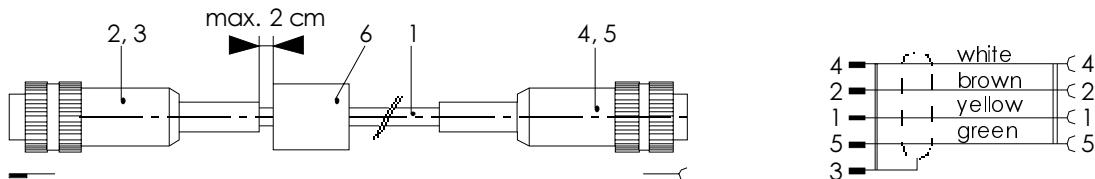
Gauge	suitable for measurement boards		Flange	Ordering number	
	TPR 010	PI 300D PI 300DL	DN 10 ISO-KF	BG G02 270	
	TPR 017	PI 300DN PI 300DLN	DN 16 ISO-KF DN 16 CF-F	BG G12 270 BG G12 271	
	TPR 018	PI 300D PI 300DL	DN 16 ISO-KF DN 16 CF-F DN 40 CF-F	BG G15 010 BG G15 011 BG G15 014	
	IKR 050	PE 300C9 PE 300C10 PE 300DC9	CP 300C9 CP 300C10 CP 300C9N CP 300C10N	DN 25 ISO-KF DN 40 ISO-KF DN 40 CF-F	BG G18 500 BG G18 501 BG G18 502
	IKR 060	PE 300C9 PE 300C10 PE 300DC9	CP 300C9 CP 300C10 CP 300C9N CP 300C10N	DN 40 ISO-KF DN 40 CF-F	BG G18 753 BG G18 751
	IKR 070	PE 300T10 PE 300T11 PE 300DT9	CP 300T9L CP 300T9LN CP 300T10 CP 300T10L CP 300T11 CP 300T11L	DN 40 ISO-KF DN 40 CF-F	BG G20 501 BG G20 502

7.2 Measurement cables

Pirani measurement cable, screened

Gauge	Gauge connector	Length	Ordering number
TPR 010	BG G02 270	C91E (new)	3 m BG 548 401 -T
	BG G02 271		6 m BG 548 403 -T

Other cable lengths on request



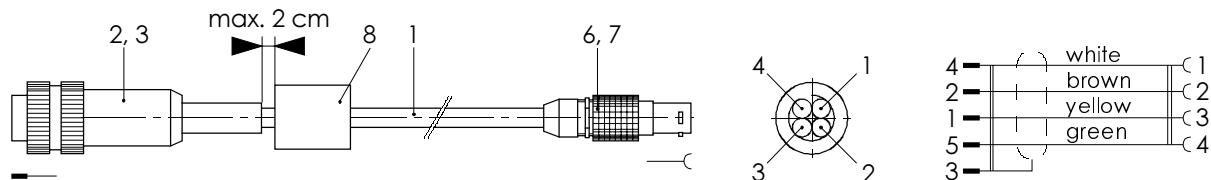
Position	Designation	Quantity	Ordering number
1	Cable 4x0,34 mm ² , screened, 80 °C		B 4590 198 CC
2	Connector Amphenol C91E	1	B 4722 715 CA
3	Crimp terminal for connector C91E *)	5	B 4722 841 CA
4	Cable connector Amphenol C91E	1	B 4722 755 CA
5	Sleeve terminal for connector C91E *)	4	B 4722 846 CA
6	Ferrite clamp	1	B 5144 406 FH

High temperature cables on request

*) Simple crimp pliers Amphenol FA0100-146 or hand crimp pliers Amphenol FA0500 with jaw FA0001-91 required.

Gauge		Gauge connector	Length	Ordering number
TPR 017	BG G13 270	LEMO	3 m	BG 548 308 -T
	BG G13 271		6 m	BG 548 309 -T
TPR 018	BG G15 010	LEMO	3 m	BG 548 308 -T
	BG G15 011		6 m	BG 548 309 -T
	BG G15 014			

Other cable lengths on request



Position	Designation	Quantity	Ordering number
1	Cable 4x0,34 mm ² , screened, 80 °C		B 4590 198 CC
2	Connector Amphenol C91E	1	B 4722 715 CA
3	Crimp terminal for connector C91E *)	5	B 4722 841 CA
6	Cable connector LEMO FGJ.1B.304	1	B 4722 063 LU
7	Crimp terminal for LEMO FGJ.1B.304 *)	4	B 4722 953 LU
8	Ferrite clamp	1	B 5144 406 FH

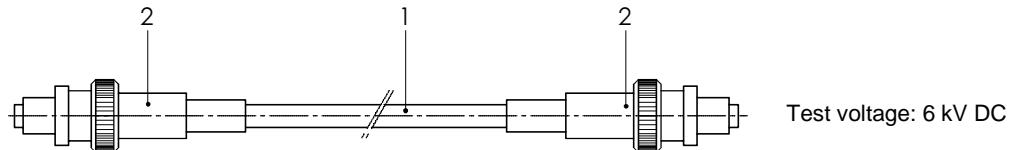
High temperature cable on request

*) Simple crimp pliers Amphenol FA0100-146 or hand crimp pliers Amphenol FA0500 with jaw FA0001-91 required.

Cold cathode measurement cable

Gauge	Gauge cable	Length	Ordering number
IKR 050	BG G18 500 BG G18 501 BG G18 502	SHV – coaxial (new) 3 m 6 m	BG 548 406 -T BG 548 407 -T
IKR 060	BG G18 751 BG G18 753	SHV – coaxial (new) 3 m 6 m	BG 548 406 -T BG 548 407 -T

Other cable lengths on request

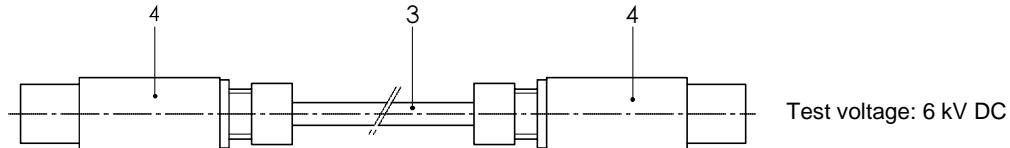


Position	Designation	Quantity	Ordering number
1	Cable, coaxial, 75 Ω, 67 pF/m		B 4582 232 SE
2	Coaxial connector SHV	2	B 4728 606 B9

High temperature cable on request

Gauge	Gauge connector	Length	Ordering number
IKR 070	BG G20 501	3 m	BG 548 306 -T
	BG G20 502	6 m	BG 548 317 -T

Other cable lengths on request



Position	Designation	Quantity	Ordering number
3	Cable, triaxial, 75 Ω		B 4582 008 FA
4	Triaxial connector with locking nut	2	B 4722 658 LU

7.3 Accessories for interface boards

		Ordering number
D-sub coupling complete, 15 pin, female	for IF 300A	BG 441 129 -T
D-sub coupling complete, 9 pin, female	for IF 300A	BG 441 128 -T
Relay connector complete, 15 pin, DIN 41 612	for IF 300B	BG 546 999 -T
Interface cable RS-232-C, 0.4m	for IF 300B	BG 548 932 -T
D-sub coupling complete, 15 pin, female	for IF 300C	BG 441 129 -T
D-sub connector complete, 9 pin, male	for IF 300C	BG 441 145 -T

8 Spare parts

8.1 Measurement boards

			Ordering number
For gauges TPR 010, TPR 018 (tungsten filament)			
Dual Pirani for cables up to 100 m	PI 300D		BG 546 920 -T
Dual Pirani for cables from 100 to 500 m	PI 300DL		BG 549 212 -T
For gauge TPR 017 (nickel filament)			
Dual Pirani for cables up to 100 m	PI 300DN		BG 549 214 -T
Dual Pirani for cables from 100 to 500 m	PI 300DLN		BG 549 216 -T
For gauges IKR 050, IKR 060, IKR 070			
Single cold cathode 5×10^{-9} mbar, coaxial	PE 300C9		BG 441 170 -T
Single cold cathode 1×10^{-10} mbar, coaxial	PE 300C10		BG 441 261 -T
Single cold cathode 1×10^{-10} mbar, triaxial	PE 300C9		BG 441 262 -T
Single cold cathode 10^{-11} mbar, triaxial	PE 300C10		BG 441 263 -T
Dual cold cathode 1×10^{-9} mbar, coaxial	PE 300DC9		BG 441 375 -T
Dual cold cathode 1×10^{-9} mbar, triaxial	PE 300DT9		BG 441 350 -T
For gauges TPR 010, TPR 018, IKR 050, IKR 060, IKR 070 combined (tungsten filament)			
Pirani / cold cathode for cables up to 100 m 5×10^{-9} mbar, coaxial			
Pirani / cold cathode for cables from 100 to 500 m 5×10^{-9} mbar, triaxial	CP 300C9		BG 441 000 -T
Pirani / cold cathode for cables up to 100 m 1×10^{-10} mbar, coaxial	CP 300T9L		BG 441 111 -T
Pirani / cold cathode for cables up to 100 m 1×10^{-10} mbar, triaxial	CP 300C10		BG 441 114 -T
Pirani / cold cathode for cables from 100 to 500 m 1×10^{-10} mbar, triaxial	CP 300T10		BG 441 116 -T
Pirani / cold cathode for cables up to 100 m 10^{-11} mbar, triaxial	CP 300T10L		BG 441 143 -T
Pirani / cold cathode for cables from 100 to 500 m 10^{-11} mbar, triaxial	CP 300T11		BG 441 080 -T
	CP 300T11L		BG 441 120 -T

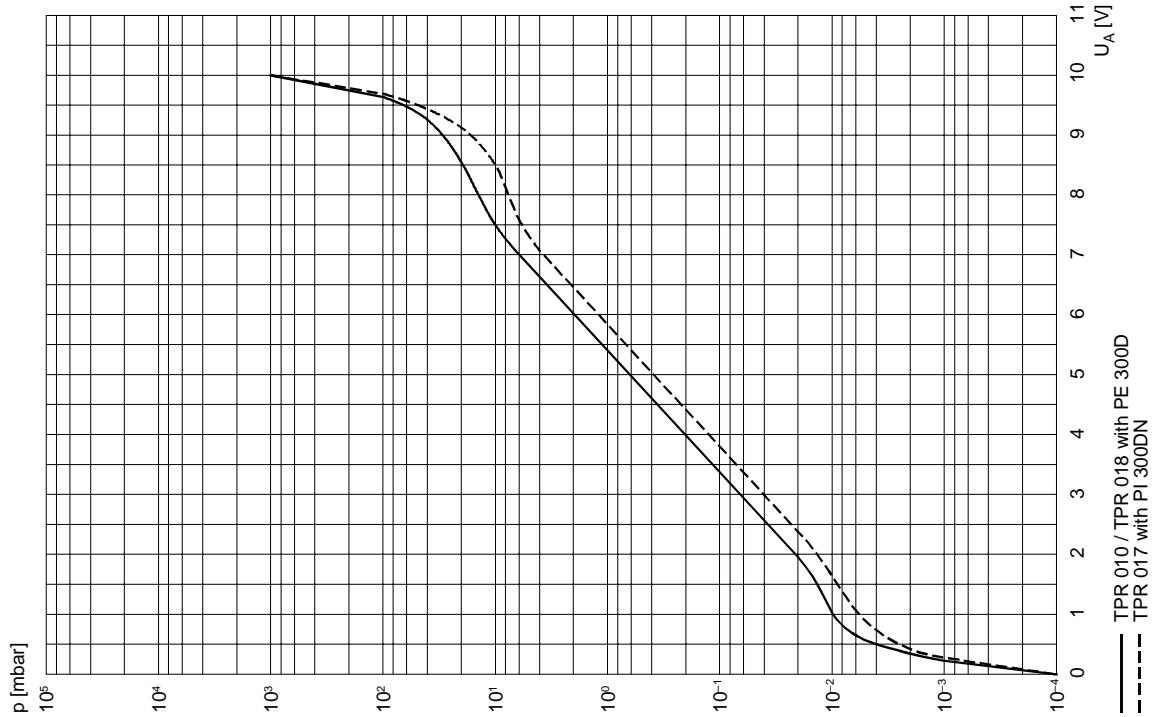
	Ordering number
For gauges TPR 017, IKR 050, IKR 060, IKR 070 combined (nickel filament)	
Pirani / cold cathode for cables up to 100 m 5×10^{-9} mbar, coaxial	CP 300C9N
Pirani / cold cathode for cables from 100 to 500 m 5×10^{-9} mbar, triaxial	CP 300T9LN
Pirani / cold cathode for cables up to 100 m 1×10^{-10} mbar, coaxial	CP 300C10N
Other measurement boards on request	BG 441 110 -T BG 441 112 -T BG 441 115 -T
	Ordering number
Connector Amphenol C91E, 7 pin	B 4722 107 CC
Ferrite clamp ø6.0 ... 7.0 mm (PI cable)	B 5144 406 FH
Ferrite clamp ø7.8 ... 8.5 mm (RS-232-C cable for IF 300B)	B 5144 408 FH
Ferrite clamp ø9.5 ... 10.5 mm (relay cable for IF 300B)	B 5144 410 FH
Cable strap	B 4631 761 BL
Laboratory connector, gold plated, ø2 mm	B 4711 152 MA
Grommet for laboratory connector, red	B 4711 152 N2
Grommet for laboratory connector, black	B 4711 152 NZ

8.2 Interface boards

	Ordering number
Relay and interface board RS-232-C 50 V~	IF 300A
Relay and interface board RS-232-C 250 V~ (without connection cable and connectors)	IF 300B
Relay and interface board RS-422 50 V~	IF 300C
	BG 441 130 -T BG 441 250 -T BG 441 390 -T

Appendix

A: Output signals of the measurement boards



BG 800 342 BE / C (9806) SK 300

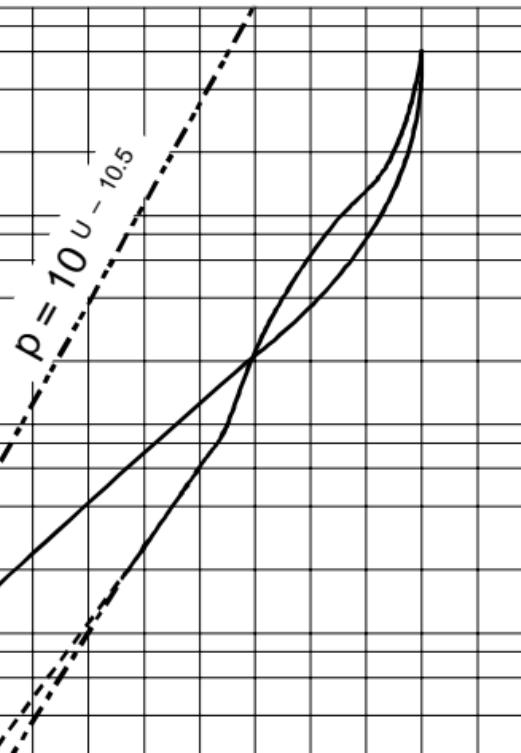
p [mbar]

10^{-2}

10^{-3}

10^{-4}

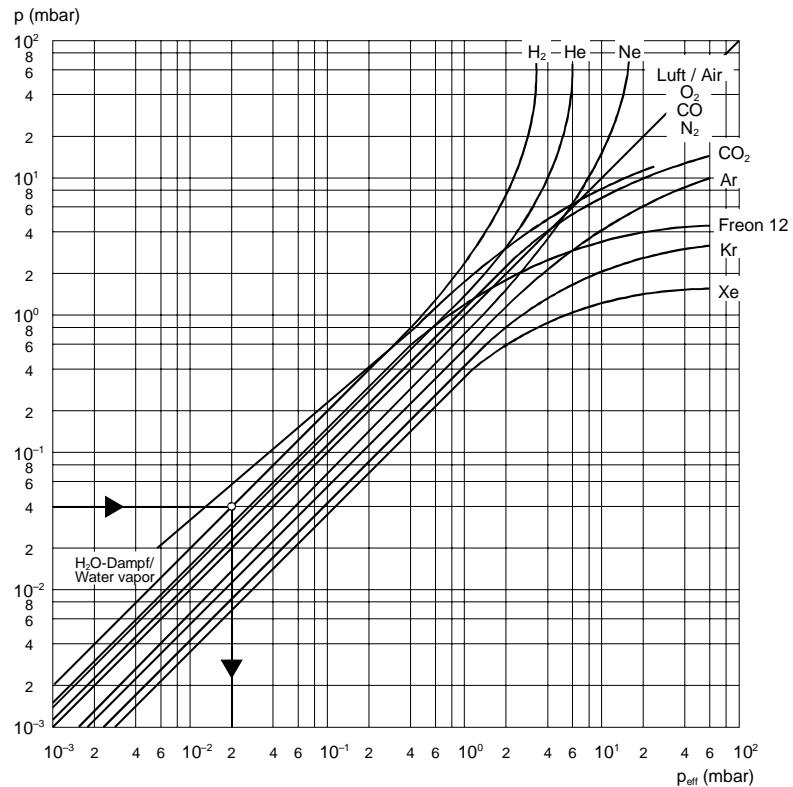
10^{-5}



B: Gas type dependence

Pirani gauges

Indicated pressure
(Instrument calibrated for air)

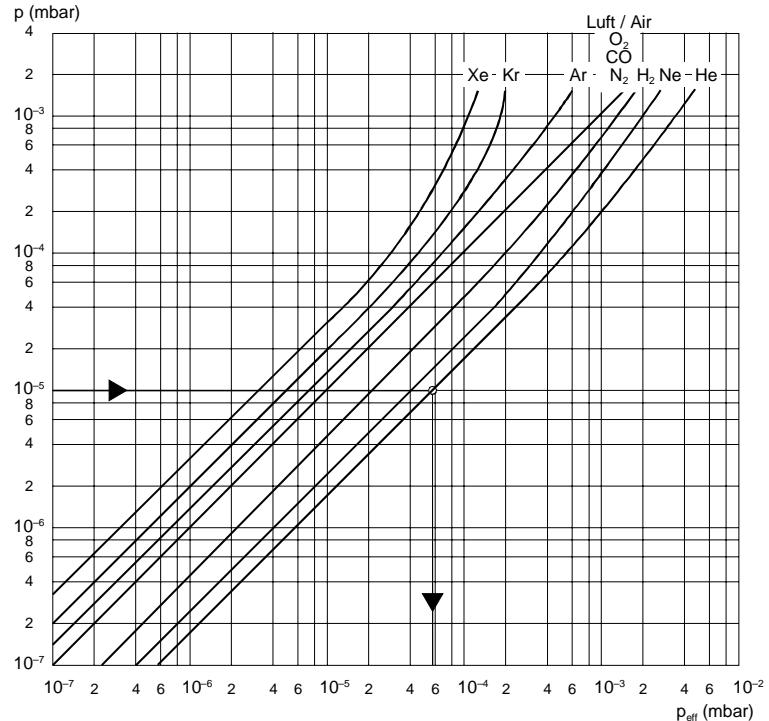


Cold cathode gauges

Indicated pressure
(Instrument calibrated for air)

(Mean values, deviations possible depending on degree of contamination).

Reference gauge: Hot cathode ionization gauge



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